

**ABSTRACT OF THE INVENTION**

Dental bonding compositions and methods for promoting adhesion of an amalgam-based restorative material to a dental substrate. The inventive compositions include one or more polymerizable resins that are able to adhere to a dental substrate when at least partially polymerized, one or more polymerization photoinitiators in an amount so as to result in partial polymerization of the resin when the compositions are irradiated with radiant energy, and one or more chemical initiators (*e.g.*, benzoyl peroxide) that cause further polymerization of the resin when the composition is contacted with an amalgam restorative. A bonding composition applied to a dental substrate and irradiated with radiant energy is more polymerized in a region adjacent to the dental substrate, while a less polymerized inhibition layer forms in the region of the surface. Packing an uncured amalgam into the dental preparation mechanically disrupts the inhibition layer so as to form peaks, troughs and other irregularities. Upon curing the amalgam and bonding composition, the disrupted inhibition layer greatly enhances the overall bond between the amalgam, bonding composition, and dental substrate.

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